

## PATENT ABSTRACTS OF JAPAN

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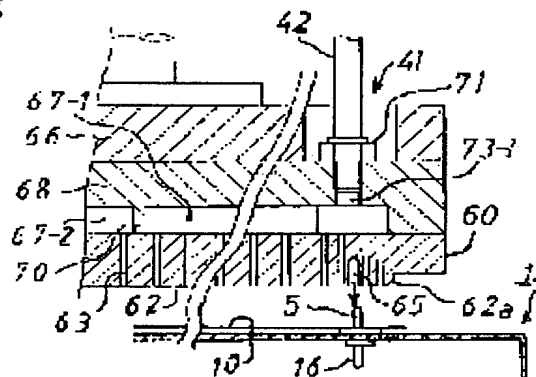
## (54) SUCTION CUP FOR FILM SUBSTRATE

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a suction cup for a film substrate capable of sucking and holding a printing surface of the film substrate without damaging the printing surface and preventing lowering of a suction function due to leakage of air from a part of suction holes from affecting the whole of the suction cup.

**SOLUTION:** The suction cup is formed into a rectangular shape corresponding to an outer peripheral end part of the film substrate and is provided with a suction surface 62 with many opened suction holes 62. The suction surface 62 is divided into four or more areas so that the four corner parts may be included in each different area S1, 2, 3 and 4 and is connected to a suction source via a suction path independent for every area S1, 2, 3 and 4.

Preferably, when suction force is increased by making distribution density of the suction holes 63 at the corner parts to be vital points for a holding action larger than that of the suction holes 63 except the corner parts, a sucking and holding action of the film substrate is further improved.



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**CLAIMS**

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[Claim(s)]

[Claim 1] It is an adhesive disk for carrying out adsorption maintenance, and conveying or transferring a film substrate by reduced pressure. It has the adsorption side as for which a hole carries out opening, while being formed in the shape of [ corresponding to the periphery edge of a film substrate ] a rectangle -- much adsorption -- The adhesive disk for film substrates characterized by having connected with the source of suction through the suction path which divided the adsorption side into four or more fields so that it might be contained to the field to which the four-corners sections differ, respectively, and became independent for every field.

[Claim 2] the air adsorption in the corner of an adsorption side -- the distribution density of a hole -- the adsorption of those other than a corner -- the adhesive disk for film substrates according to claim 1 characterized by considering as size from the distribution density of a hole

[Claim 3] The adhesive disk for film substrates according to claim 1 or 2 characterized by forming the peripheral edge edge of an adsorption side in an R side.

[Claim 4] The adhesive disk for film substrates according to claim 1, 2, or 3 characterized by having formed in the four-corners section of an adsorption side the clearance hole which misses the stop pin of a film substrate holder at the time of adsorption.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] The invention in this application relates to the adhesive disk suitable for the transfer or conveyance of a film substrate used mainly as a substrate of a liquid crystal display.

[0002]

[Description of the Prior Art] an adsorption side -- much adsorption -- the adhesive disk which forms, adsorbs a sheet metal-like work, a film, or the lap for packing with reduced pressure, and transfers or conveys a hole is used by manufacture processing of various industrial products or the product packaging process

[0003] the adsorption side where the adhesive disk of this seed air formula usually contacts all over a work -- having -- the whole adsorption side surface -- continuing -- adsorption -- the hole is distributed and it has connected with sources of suction, such as a vacuum pump, in many cases through a single suction path

[0004]

[Problem(s) to be Solved by the Invention] By the way, although the glass substrate is mainly conventionally used about substrates, such as a liquid crystal display, in these days, the so-called film liquid crystal using the film substrate which is thin and has flexibility to plan thin-shape[ lightweight-izing and ]-izing and cost reduction is developed. Therefore, the following technical problems which were not generated when an adhesive disk was used conventionally [ above-mentioned ] to the glass substrate which has rigidity when aimed at a flexible film substrate also about a transfer or conveyance of a substrate arise.

[0005] (1) Since an ITO electrode pattern etc. is printed, with the structure where the whole adsorption side surface contacts and sticks to a film substrate, a blemish tends to be attached to the front face of a film substrate, and the film substrate of business, such as a liquid crystal display, leads to the yield fall of a product, when conveying or transferring using an adhesive disk.

[0006] (2) Since a film substrate does not have rigidity, it is easy to wrinkle and it is easy to curve the time of adsorption work -- a part -- adsorption -- that a crevice is generated between a hole and a film substrate thinks -- having -- this case -- the former -- like -- all adsorption, if the hole has connected with sources of suction, such as a vacuum pump, through a single suction path above -- a part -- adsorption -- adsorption of others [ leak / air / from a hole ] -- all holes are affected and the adsorption function of the whole adsorption side falls, and when the worst and a film fall, it thinks

[0007]

[Objects of the Invention] without the purpose of the invention in this application

damages a film substrate for the printing side etc. -- good -- adsorption maintenance -- it can do -- moreover -- a part -- adsorption -- even if there is leak of air from a hole, the fall of the adsorption function by it is offering the adhesive disk for film substrates which is less than the whole

[0008]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem the adhesive disk for film substrates of this application claim 1 publication It is an adhesive disk for carrying out adsorption maintenance, and conveying or transferring a film substrate by reduced pressure. It has the adsorption side as for which a hole carries out opening. while being formed in the shape of [ corresponding to the periphery edge of a film substrate ] a rectangle -- much adsorption -- An adsorption side is divided into four or more fields so that it may be contained to the field to which the four-corners sections differ, respectively, and it is characterized by having connected with the source of suction through the independent suction path for every field.

[0009] air adsorption [ in / the corner of an adsorption side / on the adhesive disk for film substrates according to claim 1, and / in invention according to claim 2 ] -- the distribution density of a hole -- the adsorption of those other than a corner -- it is characterized by considering as size from the distribution density of a hole

[0010] Invention according to claim 3 is characterized by forming the peripheral edge edge of an adsorption side in an R side in the adhesive disk for film substrates according to claim 1 or 2.

[0011] Invention according to claim 4 is characterized by having formed in the four-corners section of an adsorption side the clearance hole which misses the stop pin of a film substrate holder at the time of adsorption in the adhesive disk for film substrates according to claim 1, 2, or 3.

[0012]

[Embodiments of the Invention] First, the structure of the film substrate for liquid crystal displays used as the adsorption object of the adhesive disk concerning the invention in this application and its conveyance holder is explained. Drawing 9 is the plan of the conveyance holder 1, the holder main part 2 is formed in the shape of a rectangle frame, and the bracket 3 for pin attachment jutted out over the four corners of this holder main part 2 to the method of the inside of a main part is formed in one. The stop pin 5 which projects upwards to each bracket 3 is set up, respectively, and the washer 7 is attached in each stop pin 5 respectively free [ attachment and detachment ] as a \*\*\*\* implement. The holder main part 2 and a bracket 3 carry out sheet metal bending fabrication using the existing heat-resistant and chemical-resistant SUS material, and the washer 7 is formed by resins, such as Teflon (tetrafluoroethylene resin).

[0013] The inner spur dimension a 1 of a holder main part and A2 are greatly set up, respectively rather than the dimension B1 of the rectangle-like film substrate 10 shown by the imaginary line, and B-2, thereby, when it equips with the film substrate 10, only the four corners of the film substrate 10 are supported by each bracket 3, and other portions contact the holder main part 2. That is, the touch area of the film substrate 10 and the holder main part 2 is held down to necessary minimum.

[0014] As shown in drawing 7 , a reinforcing rib 12 is formed in the periphery edge of the holder main part 2, the film contact seat 14 of a major diameter is formed in the soffit of each stop pin 5 at one, to the film contact seat 14 down side, the holder gage pin 16 of the same axis as the stop pin 5 projects downward, and spherical-surface section 16a is formed in the soffit of the holder gage pin 16.

[0015] Drawing 10 is the plan of the film substrate 10 which has flexibility, it is made of

PC (polycarbonate) etc., and while thickness is formed in about 0.1mm and formed in the shape of a rectangle as mentioned above, the mounting holes 21, 22, 23, and 24 for stop pin insertion are formed in four corners, respectively.

[0016] Drawing 1 is the appearance schematic drawing of the substrate transfer equipment 32 equipped with the air formula adhesive disk 41 concerning the invention in this application. The work which takes out one film substrate 10 at a time from the fixed maintenance base 34 or other film substrate supply bases (not shown), and is supplied to the conveyance holder 1 on a transport device 33. Or the film substrate 10 with which the conveyance holder 1 on a transport device 33 is equipped is removed upwards, and it is used for the work transferred to the fixed maintenance base 34 or other film substrate supply bases (not shown).

[0017] The substrate transfer equipment 32 is equipped with the level rectilinear-motion type actuator 37 which continued above the gone up and down type maintenance base 35 in a transport device 33, and has been arranged from the upper part of the fixed maintenance base 34 or a film substrate supply base, and the vertical rectilinear-motion type actuators 40, such as a rise-and-fall cylinder with which the move child 38 of this level rectilinear-motion type actuator 37 was equipped, and the air formula adhesive disk 41 is attached in the soffit of rod 40a of this vertical rectilinear-motion type actuator 40. The air suction hose 42 is connected to the four corners of the upper surface of the air formula adhesive disk 41, respectively, and independently, although and each air suction hose 42 does not illustrate the inside of the level rectilinear-motion type actuator 37 etc., it is connected to sources of air suction, such as a vacuum pump, through ON and an OFF controlling mechanism, respectively.

[0018] The bottom plan view of an adhesive disk 41 is shown, the adsorption section 60 made of a resin formed in the shape of a rectangle frame is attached in the base of an adhesive disk 41 with many bolts 61, drawing 2 is formed at this adsorption section 60 so that the adsorption side 62 which has the fixed width of face W1 corresponding to a film substrate periphery edge may cover an adsorption section perimeter, therefore the flat-surface configuration of the adsorption side 62 whole has also become rectangle-like. the pin by which the stop pin 5 of the aforementioned substrate holder 1 ( drawing 7 ) can fit into the adsorption side 62 in the four corners -- while a hole 65 is formed -- the whole surface of the adsorption side 62 -- continuing -- much adsorption -- the hole 63 is formed adsorption -- the path of a hole 63 is carrying out to the size which does not have influence in a substrate, for example, 0.8mmphi adsorption -- a hole 63 is divided into four fields S1 which are divided into two or more fields by two or more suction paths which they open for free passage, for example, were divided by the right-and-left width-of-face center line X of the adsorption section 60, and the order width-of-face center line Y, and 2, 3 and 4, and is open for free passage in the source of suction through the independent suction path for every [ each field S1, 2 and 3, and ] four This composition is explained in detail later.

[0019] drawing 6 which shows the enlarged view of the arrow VI portion of drawing 2 -- setting -- adsorption -- each train covered the adsorption side perimeter by setting an interval d1 in the adsorption \*\*\*\* W1 direction, and being arranged in portions other than the four-corners section, at two trains, the hole 63 placed regular-intervals c1, and it has stood in a line on the other hand -- the four-corners section -- portions other than four corners -- comparing -- adsorption -- the surroundings of the clearance hole 65 which the distribution density of a hole 63 is large, for example, misses the stop pin 5 of the aforementioned substrate holder 1 -- eight adsorption -- it has surrounded in the shape of a square (the shape of or a circle) at the narrow interval d2 with the hole 63

[0020] Drawing 4 is the IV-IV cross-section enlarged view of drawing 2, the adsorption section 60 is being fixed to the inferior surface of tongue of the suction case 68 where it has the suction path (vacuum chamber) 67, removable with the aforementioned bolt 61, the adsorption side 62 is projected below for a while from the soffit side of the adsorption section 60, and the ends edge of the adsorption side 62 is formed in R side 62a. the width of face W2 of the suction path 67 -- adsorption -- the aforementioned interval d1 of a hole 63 -- large -- adsorption -- the hole 63 is open for free passage for the suction path 67

[0021] Although drawing 3 is the bottom plan view of the suction case 68 and the suction path 67 is formed in the shape of a rectangle as a whole On the center line Y of order width of face, a septum 70 is formed the center line X top of right-and-left width of face, respectively. by that cause It is divided into four L typeface suction paths 67-1 in which it became independent, and 2, 3 and 4, and, moreover, the air end connection 73-1 belonging to each suction path 67-1, and 2, 3 and 4 connected to the source of suction for every corner, and 2, 3 and 4 are formed.

[0022] the adsorption in which each suction path 67-1, and 2, 3 and 4 belong to each field S1 of drawing 2, and 2, 3 and 4 -- [0023] connected to a hole 63 independently for every field Drawing 5 is the V-V cross-section enlarged view of drawing 2, for example, one of the four aforementioned air hoses 42 has connected it to the 1st air end connection 73-1 through the joint metallic ornaments 71. Of course, each air connection hose 42 of drawing 1 has connected also with other air end connections 73-2 of drawing 3, and 3 and 4, respectively.

[0024] Drawing 7 is the elements on larger scale of the gone up and down type maintenance base 35 arranged in a transport device 33, and the transport device 33 is equipped with the conveyance chain 44 which has the free roller 43 one pair of right and left, supports the right-and-left edge of the conveyance holder 1 on each free roller 43, and conveys it. If the conveyance holder 1 contacts in the middle of conveyance at a stopper, although the free roller 43 will continue moving with a chain 44, the idle state according [ the conveyance holder 1 ] to a stopper is maintained.

[0025] The gone up and down type maintenance base 35 is arranged between the conveyance chains 44 on either side, and is supporting four pin cradles 46 corresponding to four holder gage pins 16 of the conveyance holder 1 at the rise-and-fall base 50 through the adjustment mechanism 48 for height adjustment. It goes up and down the rise-and-fall base 50 through rod 51 grade with pneumatics equipment etc. The pin cradle 46 has the cone impression 47 of an upper aperture, and when the holder gage pin 16 contacts this cone impression 47, it can position the holder gage pin 16 automatically. The height of each pin cradle 46 can be adjusted by rotation operation of the adjustment mechanism 48.

[0026] If the pin cradle 46 is descending rather than the position usually shown by drawing 7, the conveyance holder 1 is conveyed to the upper part of the gone up and down type maintenance base 35 and it is stopped by the stopper in a predetermined position The pin cradle 46 goes up, makes the cone impression 47 contact the holder gage pin 16, and goes up further. The holder gage pin 16 can be positioned by alignment guide operation of the cone impression 47, making the conveyance holder 1 secede from the free roller 43 of a transport device 33 upwards.

[0027] Drawing 8 is the detail drawing of the fixed maintenance base 34, is supporting the base plate 57 through the adjustment bolt 56 by four support saddles 55, and can adjust [ rotation of the adjustment bolt 56 ] now the height and levelness of a base plate 57. Each adjustment bolt 56 is connected with the base plate 57 through spherical-

surface bush 56b while it has head 56a for operation which gave knurling tool processing etc. Four cone crevices 58 and 59 (two pieces are displayed) corresponding to the holder gage pin 16 of the conveyance holder 1 are formed in the base plate 57. Among those, two cone crevices (one piece is displayed) 58 in a diagonal position As shown in left-hand side, the holder gage pin 16 contacts the cone crevice 58. As it can position now and the two remaining cone crevices (one piece is displayed) 59 are shown in right-hand side, it is a clearance hole, and when the film conveyance holder 1 is laid in a base side, it is deeply formed so that it may be in the state where it floated from the inside of the cone crevice 59.

[0028]

[Function] In transferring the film substrate 10 laid in the predetermined position of the fixed maintenance base 34 grade of drawing 1 to the substrate holder 1 of the gone up and down type maintenance base 35 of a transport device 33, an adhesive disk 41 is descended from the state of drawing 1, and the pin clearance hole 65 fits in with play like the arrow of drawing 5 to the stop pin 5 of a holder 1. The stopping accuracy of this level rectilinear-motion type actuator 37 performs positioning of the adsorption side 62 over the film substrate 10, and the periphery edge of the film substrate 10 is made to contact. Since the ITO electrode pattern of the film substrate 10 etc. does not get damaged since the adsorption side 62 contacts only the periphery edge of the film substrate 10 at this time, and the edge of the adsorption side 62 is moreover formed in R side 62a, a blemish is not attached to the film substrate 10 by the end face of the adsorption side 32.

[0029] if the adsorption side 62 contacts the film substrate 10 -- adsorption -- the suction effect of a hole 63 adsorbs in the film substrate 10 the four-corners section which serves as a vital part point of an absorption (substrate maintenance) at this time -- adsorption -- according to the distribution density of a hole 63 being large, the adsorption power is increasing, the four corners of the film substrate 10 can be adsorbed more powerfully than portions other than four corners, and the film substrate 10 can be certainly held in the flat-surface state

[0030] After adsorption goes up with the vertical rectilinear-motion type actuator 40 of drawing 1, moves with the level rectilinear-motion type actuator 37 onto the gone up and down type maintenance base 35 of a transport device 33, descends and supplies the film substrate 10 on a holder 1 like drawing 7. under a transfer -- temporary -- a part -- adsorption -- even if the film substrate 10 floats from a hole 63 and air leaks, although the absorption in the field falls, since each suction path 67-1, and 2, 3 and 4 are independent, influence does not attain to the absorption of other three fields After that, a suction effect is stopped and only an adhesive disk 41 is raised.

[0031]

[The gestalt of other operations] (1) drawing 2 and drawing 3 -- adsorption of the adsorption side 62 -- although considered as the L character type which divides a hole 63 into four fields S1, and 2, 3 and 4, and includes a corner, respectively, dividing more than it is also possible For example, it is also possible to form a respectively new field in the center section of each side, and to divide into eight fields as a whole.

[0032] (2) It is also possible to apply to the adhesive disk which does not have a clearance hole 65 in the four corners.

[0033]

[Effect of the Invention] (1) It has the adsorption side 62 as for which a hole 63 carries out opening. like invention of this application claim 1 publication, it is formed in the shape of [ corresponding to the periphery edge of a film substrate ] a rectangle -- both



-- much adsorption -- If the adsorption side 62 was divided into four or more fields so that it might be contained in the field S1 where the four-corners sections differ, respectively, and 2, 3 and 4, and it has connected with the source of suction through the independent suction path 67-1, and 2, 3 and 4 for every [ each field S1, 2 and 3, and ] four Since only the periphery edge of a film substrate is adsorbed and is held at the time of adsorption, a blemish is not attached to the ITO electrode putter of a film substrate etc.

[0034] (2) under a transfer or conveyance -- a part -- adsorption -- even if a film substrate floats from a hole 63 and air leaks, since the suction path 67-1, and 2, 3 and 4 are divided or more into four, only the absorption in the field falls and don't affect the absorption of other fields since it divides so that it may be contained to the field to which the four-corners sections differ especially, respectively -- a part of adsorption -- a bird clapper does not have the corner which serves as a vital part point of a maintenance operation by leak of the air of a hole 63 in poor two or more place adsorption

[0035] (3) the adsorption which exists in the corner used as the vital part point of a maintenance operation like invention according to claim 2 -- the distribution density of a hole 63 -- the adsorption of those other than a corner -- \*\*\*\*\* which increases an adsorption power, and an adsorption maintenance operation of a film substrate improve further as a size from the distribution density of a hole

[0036] (4) Like invention according to claim 3, if the peripheral edge edge of the adsorption side 62 is formed in R side 62a, a film substrate will not be damaged by the end face of the adsorption side 62 at the time of adsorption.

[0037] (5) Even when the clearance hole 65 for missing the stop pin 5 of the substrate holder 1 in the four-corners section of the adsorption side 62 like invention according to claim 4 was formed and any of the substrate holder 1 which does not have the substrate holder 1 which has the stop pin 5, or the stop pin 5 are used, it can be made to be able to adsorb by the same adhesive disk, and the adhesive disk which was rich in versatility can be offered.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the appearance schematic drawing of the air formula transfer equipment which has the air formula adhesive disk which applied the invention in this application.

[Drawing 2] It is the bottom plan view of the adhesive disk which applied the invention in this application.

[Drawing 3] It is the bottom plan view of the suction case of the adhesive disk of drawing 1 .

[Drawing 4] It is the IV-IV cross-section enlarged view of drawing 2 .

[Drawing 5] It is the V-V cross-section enlarged view of drawing 2 .

[Drawing 6] It is the enlarged view of the arrow VI portion of drawing 2 .

[Drawing 7] It is the enlarged vertical longitudinal sectional view of the arrow VII portion of drawing 1 .

[Drawing 8] It is the enlarged vertical longitudinal sectional view of the arrow VIII portion of drawing 1 .

[Drawing 9] It is the plan of a conveyance holder.

[Drawing 10] It is the plan of a film substrate.

[Description of Notations]

1 Conveyance Holder

2 Holder Main Part

5 Stop Pin

10 film substrate

32 Substrate Transfer Equipment

60 Adsorption Section

62 Adsorption Side

63 Adsorption -- Hole

65 Clearance Hole

67-1, 2, 3, 4 Suction path (vacuum chamber)

70 Septum

73-1, 2, 3, 4 Air connection

S1, 2, 3, 4 Field

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[Translation done.]

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